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drkp@MIT.EDU

ct@MIT.EDU

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Traceroute handson

ct@MIT.EDU
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From: "Dan R. K. Ports" <drkp@MIT.EDU>
Subject: Traceroute handson
Date: Sun, 4 Apr 2004 05:38:08 -0400
To: ct@MIT.EDU

Chris -
Here's a copy of my traceroute handson, which seems to have vanished into the ether at some point.

Dan
Dan Ports <drkp@mit.edu>
Karger TR1
6.033 handson #3 - 2004/03/11
1. --- www.csail.mit.edu ping statistics ---
20 packets transmitted, 20 packets received, 0% packet loss
round-trip min/avg/max = 4.491/28.502/95.179 ms
--- www.lb-a.stanford.edu ping statistics ---
20 packets transmitted, 20 packets received, 0% packet loss
round-trip min/avg/max = 92.262/127.499/212.536 ms

--- soiling.cs.vu.nl ping statistics ---
20 packets transmitted, 20 packets received, 0% packet loss
round-trip min/avg/max = 94.544/137.749/359.43 ms
--- www.kyoto-u.ac.jp ping statistics ---
20 packets transmitted, 20 packets received, 0% packet loss
round-trip min/avg/max = 208.405/233.399/315.077 ms
2. The minimum round trip time is much longer for hosts outside MIT than to CSAIL, because the packets must travel outside the MIT network. The pings sent to Japan take substantially longer, because they must travel a greater distance.

3. 512-byte packets:
CSAIL: round-trip min/avg/max = 7.614/36.752/143.014 ms
Stanford: round-trip min/avg/max = 94.967/127.423/199.507 ms
vu: round-trip min/avg/max = 97.112/123.603/183.804 ms
Kyoto-u: round-trip min/avg/max = 212.019/243.384/324.245 ms
1024-byte packets:
CSAIL: round-trip min/avg/max = 11.835/37.179/120.932 ms
Stanford: round-trip min/avg/max = 98.206/140.253/215.806 ms
vu: round-trip min/avg/max = 99.794/130.901/197.142 ms
Kyoto-u: round-trip min/avg/max = 216.672/254.618/315.705 ms
The larger packets take a few milliseconds longer to return. This difference is due to the increased transmission delay required to transmit the longer packets.

4. No responses were received from either wits.ac.za or microsoft.com. This suggests that ping packets were being dropped. In the case of Microsoft, ping packets are dropped for (questionable) security reasons.
5. Traceroute determines the path to a remote host by sending packets with progressively longer times-to-live, starting with a TTL of 1 hop. As the packet travels to the destination, the TTL is

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decremented by each router; when it hits zero, the router sends an error message to the sender. By increasing the TTL by 1 each time, traceroute can obtain TTL-exceeded messages from each intermediate host.

6. Here is the result of a traceroute from traceroute.hofl.net to 18.239.4.95:

```
1 node-423a4159.bos.onnet.us.uu.net (66.58.65.89) 0.714 ms 1.683 ms 0.530 ms
2 207.251.160.19 (207.251.160.19) 203.575 ms 215.614 ms 191.938 ms
3 207.251.184.38 (207.251.184.38) 207.133 ms 218.798 ms 246.081 ms
4 0.so-2-1-0.HRI.BOS4.ALTER.NET (152.63.16.57) 224.738 ms 248.434 ms 282.183 ms
5 549.at-6-0-0.XR2.BOS4.ALTER.NET (152.63.21.254) 260.987 ms 263.284 ms 266.972 ms
6 0.so-4-0-0.XL2.BOS4.ALTER.NET (152.63.16.133) 261.066 ms 245.355 ms 135.026 ms
7 0.so-1-2-0.XL2.NYC4.ALTER.NET (152.63.21.13) 158.899 ms 185.604 ms 192.037 ms
8 0.so-7-0-0.BRI.NYC4.ALTER.NET (152.63.21.81) 206.892 ms 185.585 ms 192.043 ms
9 0.so-0-0-0.edgel.NewYork1.Level3.net (209.244.160.181) 206.915 ms 248.391 ms 263.952 ms
10 ge-2-1-0.bb22.NewYork1.Level3.net (64.159.4.149) 260.995 ms 320.562 ms 303.018 ms
11 as-2-0-mp2.Boston1.Level3.net (64.159.3.142) 357.104 ms 377.650 ms 377.952 ms
12 ge-11-0.hsai.Boston1.Level3.net (64.159.3.142) 357.104 ms 377.650 ms 377.952 ms
13 p0-0.mit3.bbplanet.net (4.24.88.50) 390.358 ms 436.667 ms 413.863 ms
14 NW12-RVR-2-BACKBONE.MIT.EDU (18.168.0.21) 413.920 ms 434.315 ms 398.811 ms
15 ANEBULATORY-CLAM.MIT.EDU (18.239.4.95) 459.068 ms 467.626 ms 464.866 ms
```

```
traceroute to traceroute.hofl.net (66.58.65.90), 30 hops max, 40 byte packets
1 mw12-rt2-w61.mit.edu (18.239.0.1) 3.207 ms 0.471 ms *
2 external-rt2-backbone.mit.edu (18.168.0.27) 0.954 ms 0.762 ms 0.567 ms
3 g3.ba21.b002250-1.bos01.atlas.cogentco.com (38.112.2.213) 1.111 ms 1.036 ms 0.829 ms
4 60-2.core01.bos01.atlas.cogentco.com (66.250.14.205) 1.233 ms 1.356 ms 1.605 ms
5 * p5-0.core01.jfk02.atlas.cogentco.com (66.28.4.118) 7.252 ms 6.268 ms
6 p4-0.core02.dca01.atlas.cogentco.com (66.28.4.81) 11.976 ms 12.319 ms 12.443 ms
7 p15-2.pr01.iad01.atlas.psa.net (154.54.2.254) 13.302 ms 13.391 ms 13.245 ms
8 204.255.173.9 (204.255.173.9) 14.573 ms 14.68 ms 14.707 ms
9 0.so-1-0-0.xl2.dca6.alter.net (152.63.41.234) 14.776 ms 19.025 ms 34.664 ms
10 0.so-0-0-0.tl2.dca6.alter.net (152.63.38.73) 22.449 ms 14.754 ms 28.629 ms
11 0.so-6-0-0.tl2.nyc9.alter.net (152.63.13.10) 12.69 ms 13.08 ms 29.719 ms
12 0.so-5-1-0.xl2.bos4.alter.net (152.63.0.217) 28.75 ms 19.739 ms 19.948 ms
13 0.so-7-0-0.xr2.bos4.alter.net (152.63.16.134) 19.637 ms 39.391 ms 19.467 ms
14 178.at-2-0-0.hri.bos4.alter.net (152.63.21.253) 41.9 ms 26.209 ms 30.705 ms
15 * * *
16 * * *
17 node-423a4159.bos.onnet.us.uu.net (66.58.65.89) 402.901 ms 428.208 ms 445.969 ms
18 node-423a415a.bos.onnet.us.uu.net (66.58.65.90) 466.707 ms 408.311 ms 436.366 ms
```

7. The traceroutes take different paths: for example, the outgoing traceroute goes from MIT to Cogent, while the incoming traceroute goes from BBN to MIT. This suggests that the routers traversed in each direction are favoring different paths, presumably due to different cost weightings.

8. traceroute to 18.31.0.200 (18.31.0.200), 30 hops max, 40 byte packets
1 b24-rt2-26.mit.edu (18.109.0.1) 22.891 ms 2.418 ms 2.27 ms
2 radole.lcs.mit.edu (18.201.1.3) 8.762 ms 5.7 ms 6.312 ms
3 anacron.lcs.mit.edu (18.24.10.1) 62.96 ms 4.321 ms 5.965 ms
4 * * * *
5 * * * *
6 * * * *
[...]

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The traceroute stops receiving responses after the third hop. This suggests that anacreon.lcs.mit.edu is dropping the packets.

9. MIT is AS 3. ✓

10. ASes 3356, 10578, 16631, and 6461 advertise direct links to MIT.

11. The connections to the internet at large are presumably transit relationships. However, the connection to Harvard (AS #10578) may be a peering relationship.

12. Approximately 1 6.170 recitation (thanks to 802.11).

\$Id: handson3.txt,v 1.1 2004/03/11 15:42:47 dan Exp \$

correct! The end host does not exist.
Algo, actually also transit (it's "Internet 2")